Public attitudes towards flooding and property level flood protection measures

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PUBLIC ATTITUDES TOWARDS FLOODING AND PROPERTY LEVEL FLOOD PROTECTION MEASURES

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ABSTRACT

The number of residential properties at risk from flooding is predicted to rise as a result of the impacts of both climate change and increasing urbanisation. At the same time, it is now clear that large scale flood defence schemes are not always feasible, and there is an increasing onus on property owners to protect their own properties. This paper reports the results of the stakeholder consultation phase of an ongoing project investigating public attitudes towards flooding and property level flood protection (PLFP).

Whilst this paper broadly confirms some of the findings of earlier UK studies, it also indicates that public education and promotion campaigns have been effective in raising awareness and uptake of PLFP, and that people are willing to pay more to protect their properties. The findings also support the idea that an increased awareness of PFLP, and an increased willingness to pay for PLFP, is linked to the scale of flooding and impacts, rather than just the frequency, as well as financial subsidies. These key messages are particularly important to institutional stakeholders, as they can help guide the development of strategies to increase the uptake of such measures.

KEYWORDS
Flood impacts; Property level flood protection; Willingness to pay.

1. INTRODUCTION

In the UK alone, over 5.2 million properties and 2.4 million people are at risk of flooding, and current annual average damages are estimated to be more than £1 billion (Evans et al., 2004). However, climate change and the increasing urbanisation of our societies is increasing flood risk (Evans et al., 2004; OST 2007). In particular, there now appears to be clear evidence that climate change will lead to an increase in the frequency and severity of extreme precipitation and other weather events (IPCC 2007); for the UK this may well result in wetter and stormier winters (UKCIP, 2009). As such, it is predicted that the risk of fluvial and coastal flooding will at least double by the 2080s, and that annual average damages will soar to some £25 billion (Evans et al., 2004).

On a more local level, the direct financial damages related to the flooding of residential properties can be significant. Depending on flood depth, it is estimated that the cost of flooding can be £10-50k for a single residential property and its contents (Bowker, 2007). Flooding at the household level can also result in less direct, insurance-related impacts (Ball et al., 2012), with premiums and flood-related excesses typically increasing following a flood event. Flood excesses of £10,000 are relatively common for UK households who have experienced repeated flooding, and such households have often had difficulty in getting insurance cover following a flood event (Werritty et al., 2007; O'Neil et al., 2012). Existing problems could well be exacerbated in the near future as the Statement of Principles between the UK Government and the Association of British Insurers (ABI, 2008) is due to expire in June 2013. As this agreement means that insurance cover in flood prone areas is effectively cross-subsidised (ABI, 2011a), failure to renegotiate a similar arrangement could lead to insurance premiums and excesses increasing towards the true market price (Ball et al., 2012), which may make some properties essentially uninsurable; across the UK, the current estimate of the number of such properties is 200,000 (O'Neil, 2012).

In addition to financial costs, flooding also has other, less tangible and often longer lasting "social" impacts (e.g. the stress of the flood event, worry about future floods, etc). Although little emphasis has historically been put on such impacts, presumably due to a general focus on direct financial impacts and difficulties in quantifying less tangible impacts, recent research suggests that social impacts are of

great significance to flood victims (RPA, 2004; Tunstall et al., 2006; Werritty et al., 2007), with survey respondents often "scoring" such impacts higher than the direct financial impacts of flooding.

Whilst large scale flood defences can be effective in reducing widespread flood risk, such developments are costly, both in terms of time and financial resources. Consequently, cost benefit analysis does not always yield a favourable result for large scale defence schemes, and the extensive flooding that has recently occurred within the UK has strengthened calls for greater use of property level flood protection (PLFP) measures (Pitt, 2008). Such measures are often temporary, demountable, and simple to install (Wingfield et al., 2005), and are generally classified as resistance or resilience measures (DEFRA, 2008). Resistance products either totally prevent floodwater from getting into a property, or "buy time" for the householder to move valuable possessions to safety, whilst resilience measures are those with the ability to minimise flood damages when floodwater actually enters a property (Wingfield et al., 2005; Joseph et al., 2011).

The problems associated with increased future flood risk, coupled with lack of resources to fund the construction of large scale flood defence systems and potential changes to flood insurance cover, will shift the onus of flood protection even more onto individual property owners. However, the uptake of PFLP measures in residential properties remains stubbornly low (DEFRA, 2008), with one study finding that only 16% of households and 32% of SMEs in areas of significant flood risk have taken practical steps to reduce their exposure to flood damage (Thurston et al., 2008). Common reasons for the low uptake of PLFP include underestimation of flood risk, a lack of understanding about flood protection responsibilities and concerns over the costs and aesthetics of such measures (Werritty et al., 2007; Thurston et al., 2008; ABI, 2011b). Moreover, the low level of awareness of PLFP products has been a major obstacle to their increased use, and it is commonly accepted that many property owners are unaware of the options, benefits and cost of such measures (DEFRA, 2008; Thurston et al., 2008).

2. METHODOLOGY

An extensive stakeholder consultation was undertaken to gain a better understanding of the public perception of flood risk in general, and property level flood protection (PLFP) in particular, and hence contribute to the evidence base needed to inform the effective promotion of PLFP. This consultation took the form of questionnaire surveys and follow-up focus groups.

The survey questionnaire was based on best practice from previous related work (RPA, 2004; Werritty et al., 2007; Thurston et al., 2008), and was designed to garner information in five key categories:

1. *Flood experience* (flood frequency/timing, flood type/characteristics, knowledge of flood risk).
2. *Flood impacts* (insured/uninsured financial losses, social impacts).
3. *Flood responsibility* (responsibility for community-level and property-level protection).
4. *Property level flood protection* (uptake, type, rationale).
5. *Willingness to pay* (maximum contribution, rationale)

A pilot survey was conducted in an area of known high flood risk (Eddleston, Scottish Borders) to determine the suitability of the questionnaire format, before being distributed (both online and postal) in a further eleven Scottish towns and cities (see Figure 1). The survey locations were identified from a flood database developed for the study and cross-checked against the SEPA Indicative River and Coastal Flood Maps to verify flood risk vulnerabilities (SEPA, 2006). In total, 1530 questionnaires were distributed with 256 responses, representing a response rate of 17%, which is considered a reasonable return for a postal/online survey format.

Following analysis of the questionnaire responses, focus group discussions were undertaken to verify, and delve deeper into, some of the findings from the questionnaire surveys. Focus groups were held in Hawick and Edinburgh, which were selected to capture information about attitudes from those living in small town with no large scale defences and those living in a major city with some large scale defences.

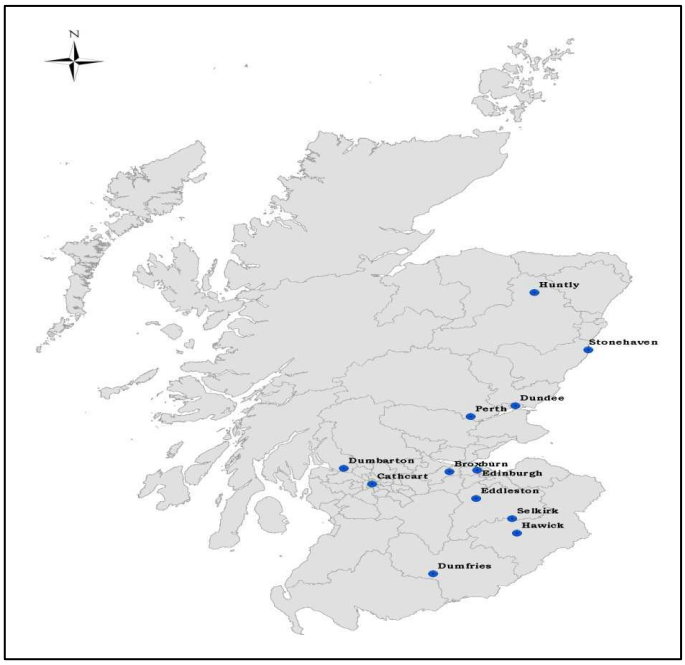

Figure 1. Survey and focus group locations.

3. RESULTS AND DISCUSSION

3.1 Flood experience

Whilst just over half of the survey respondents had not experienced flooding in their current property (58%), there was still a high awareness of the flood risk associated with their property amongst this group (68%). This level of flood risk awareness is significant, as it has been shown to be a source of motivation to individuals to undertake precautionary measures for flood events (Kreibich et al., 2011; Koerth et al., 2013). Fluvial flooding accounted for almost two thirds of all flooding incidents, followed by sewer (16.5%) and surface water (9.9%) flooding. The surprisingly high reported incidence of groundwater flooding (8.5%), which is uncommon in Scotland, was probably due to respondents mistaking water entering via airbricks for groundwater flooding. Given the survey locations shown in Figure 1, it is unsurprising to see that coastal flooding only accounted for 4% of the reported incidents. As 29% of reported floodwater pathways were through airbricks and another 29% were through doors openings, it is clear that simple flood resistant products (e.g. door cover, airbrick and vent covers) could have proved beneficial in preventing the majority of the reported flooding incidents.

3.2 Flood impacts

The financial costs of flooding were assessed by consideration of both the insured and uninsured costs that were incurred. Approximately 90% of flooded households suffered some damage to their property and possessions, and almost 92% of these households had buildings and contents insurance. For those that provided information on costs, the mean insured building and contents costs were £30,123 and £10,493 respectively, and the mean uninsured costs were £2,616. These figures are at the upper end of those previously reported in the UK. For example, Werritty et al. (2007) surveyed flood victims in Scotland and determined that buildings and contents losses were £31,980 and £13,552 respectively, whilst Bowker (2007) used measured flood depths to estimate total losses of £10-50k. RPA (2004) reported that the mean total losses (insured buildings and contents, and uninsured) for a flooded property in England was approximately £30k, whilst insurance claims following the 2007 floods in England were reported to be £23-30k (Environment Agency, 2010).

To determine the social impacts of flooding, respondents were asked to rate five separate variables based on their last flood experience, using a scale of 0-10 (0 is no impact, 5 is neutral, 10 is maximum impact). As shown in Table 1, all of the variables had a significant impact on flooded households, with

the most noteworthy being “the stress of the flood event itself” and “worry about future flooding”. These results show a similar pattern to an earlier Scottish study (Werritty et al., 2007), and broadly similar findings to an English based study (RPA, 2004). However, it is interesting to note that both Scottish based studies placed a far higher emphasis on “worry about future flooding” and far less emphasis on “having to stay in temporary accommodation”; a finding that perhaps reflects the availability of emergency accommodation in England.

Table 1. Social impacts of floods in flooded households.

Impact	Mean score*	Mean score ** (Werritty et al., 2007)	Mean score* (RPA, 2004)
Stress of flood event itself	6.97	2.03	7.1
Worry about future flooding	6.86	2.14	6.6
Getting house back to normal	6.62	2.21	7.8
Having to stay in temporary accommodation	5.31	1.62	7.0
Loss of irreplaceable items (e.g. photos)	5.22	1.53	5.6

* Score: 0 = no impact, 5 = neutral, 10 = maximum impact
** Score: 0 = no impact, 1 = mild impact, 3 = extreme impact

3.3 Flood responsibility

Figure 2 details how the survey respondents viewed the burden of responsibility for both community level (i.e. large scale, centrally funded) and property level flood protection. As shown, only 22% of the public felt they were responsible for their own protection, whilst over 70% of the public felt some other public body was responsible. These findings were confirmed by the focus group findings, are consistent with earlier similar studies (Werritty et al., 2007, and Terpstra & Gutteling, 2008), and indicate that the majority of the public remain uncertain about their responsibility towards their own flood protection.

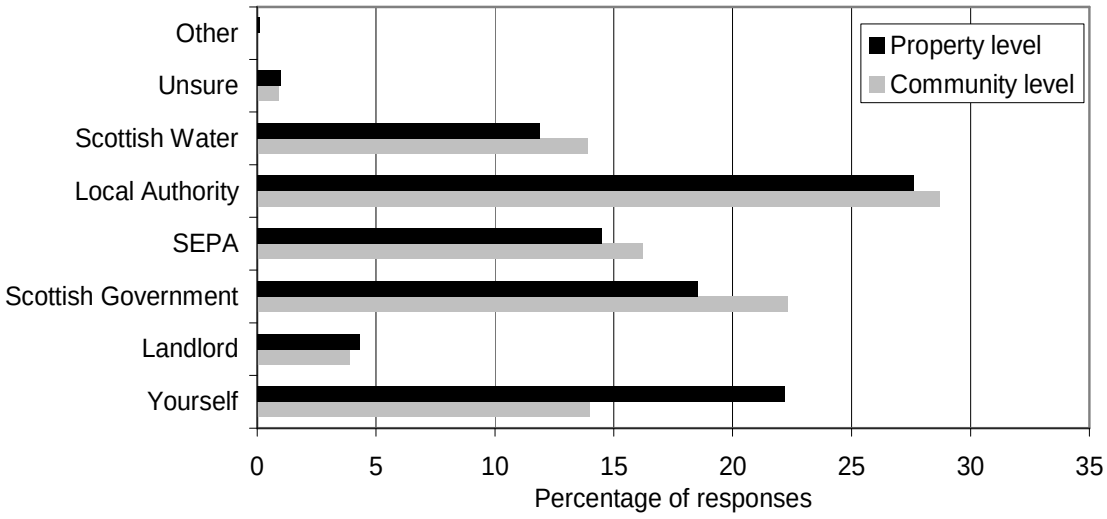

Figure 2. Flood protection responsibility at the community and property level

Interestingly, 14% of respondents felt they were responsible for community level flood protection schemes. As in most other countries, with Scotland such responsibilities actually lay with a range of relevant institutional bodies; local authorities and Scottish Water are directly responsible at the local level, whilst the Scottish Environmental Protection Agency plays a critical role in implementing flood risk management strategies and the Scottish Government provides the necessary funds (Scottish Government, 2011). Presumably those individuals who felt responsible for community level protection

were referring to a more general, “societal responsibility” expressed through payment of the taxes that fund such schemes

3.4 Property level flood protection

Despite the low numbers of respondents being aware of their own responsibility to protect their property, awareness of PLFP measures was relatively high for both flooded and non-flooded households; 77% of flooded households and 53% of non-flooded households stated that they were aware of PFLP measures, yielding an overall mean of 63%. These results differ from earlier UK studies, which suggest a lower level of awareness of PLFP products (DEFRA, 2008). This issue was further investigated in the focus group discussions where two diverging scenarios emerged; a high awareness of PFLP measures was strongly associated with communities who had been exposed to recent public education campaigns, either by local councils or flood volunteer groups, whilst a low awareness of such measures was associated with areas who had not been exposed to any form of flood education campaign. These findings seem to indicate that recent flood education campaigns have been successful in getting key messages across to the public. This echoes the findings of a survey of residents in Germany, which highlighted that providing homeowners with information on the effectiveness of flood mitigation measures and advice on the implementation of these measures can lead to increased flood precautionary behaviour (Bubeck et al., 2013).

Amongst households that had previously been flooded, the survey results point to a link between the scale of the costs incurred due to flooding and awareness of PLFP products, to the extent that the average insured buildings and contents losses amongst those PLFP aware were approximately ten times those amongst the PLFP unaware. In addition, those aware of PLFP rated two of the social impacts (“stress of flood event itself”, “having to stay in temporary accommodation”) significantly higher than those who were PLFP unaware. This would seem to indicate that it is the scale of the flooding and impacts, rather than just the frequency, that encourages people to investigate options to protect their own property.

The majority of respondents that were aware of PLFP measures had taken up some form of flood protection (61%); of this number, almost two thirds were flooded households. Just over a third received some financial aid to purchase PLFP products, with the average contribution being £223 or 39% of the total costs. The measures employed included the use of sandbags (31%), the use of door/window floodguards (25%) and airbricks or vent covers (25%). Again, these findings differ from those of earlier studies (Werritty et al., 2007; Thurston et al., 2008), who report far lower uptakes of PFLP. However, the survey results again indicate the reactive nature of people’s behaviour, as only one third of respondents purchased flood protection products before flooding.

3.5 Willingness to pay for property-level flood protection measures

Survey participants were asked whether they were willing to pay for PLFP, and if so, why and how much were they willing to pay. In total, 57% of respondents stated that they were willing to pay for PLFP. When asked to explain their willingness to pay for PLFP, at least three quarters of respondents agreed with each of the proffered reasons (to avoid the impacts associated with current flooding, to avoid the impacts associated with future flooding, to avoid increases in insurance premiums and/or excesses).

For those not willing to pay, just over half of respondents felt that they could not afford PLFP measures, and a similar proportion stated that the government/council should pay for such protection. Approximately a third of respondents indicated that they already had PLFP measures, and a further third felt that they were not at risk from flooding. A small number of people (13%) felt that such measures were simply not effective. Follow up focus group sessions highlighted that households that felt unable to afford PLFP were more likely to contribute towards the total cost if subsidies or incentives packages were introduced by government. This concurs with the findings of a German study, which concluded that providing incentives for households that implement PLFP measures (e.g. reductions in insurance premiums), could help stimulate flood mitigation behaviour (Bubeck et al., 2013).

As shown in Figure 3, the total amount households were willing to pay for PFLP ranged from £50 to £10,000, with almost 80% of respondents selecting a figure of either £100 (equivalent to air brick

covers for the whole property) or £1000 (equivalent to air brick covers and floodgates for the whole property). Interestingly, whilst the overall mean that households were willing to pay was £795, the figure for those who had previously been flooded (£734) was less than for those who had never been flooded (£834). This may indicate that people without previous flood experience tend to over estimate the cost of protecting their property. As with PLFP awareness and uptake, these findings are again at odds with earlier UK research, where just over half of survey respondents were unwilling to pay additional council tax to fund flood protection measures, and even amongst those willing to pay, only 8.5% were prepared to pay £100 or more (Werritty et al., 2007). Interestingly however, a similar Dutch study found that nearly two thirds of homeowners would be willing to invest in flood mitigation measures (e.g. water barriers) in exchange for discounted flood insurance, with the mean willing to pay value being ~€120 per year (Botzen et al., 2009).

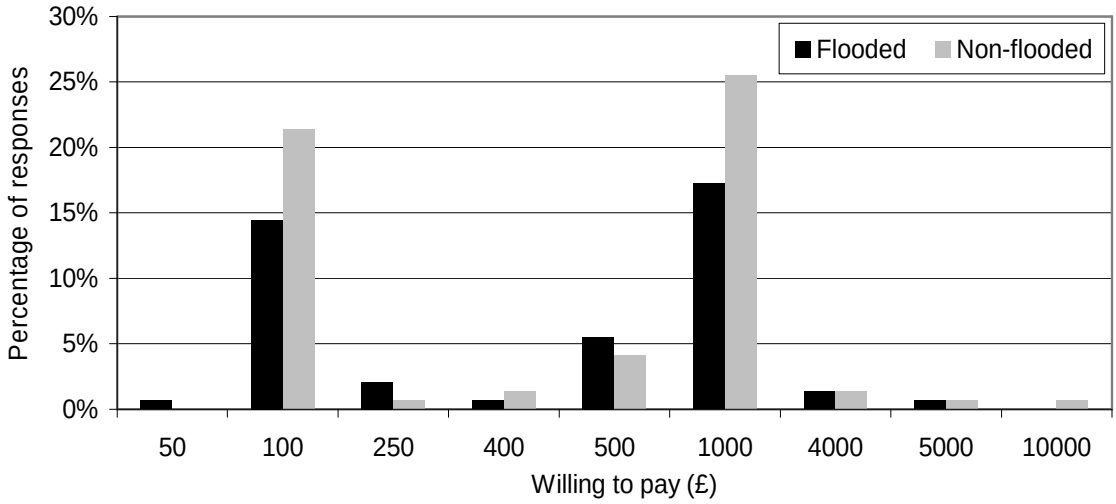

Figure 3. Willingness to pay for property-level flood protection measures.

Further analysis of the survey results suggest that there was a link between people's willingness to pay and both the level of damage previously sustained to buildings and the level of financial aid previously received for PLFP. Interestingly however, the relationship between household income and willingness to pay was less strong.

CONCLUSIONS AND FUTURE WORK

The findings reported herein are part of ongoing research into public perception of flood risk in general, and property level flood protection (PLFP) in particular. In addition to broadly confirming the findings of earlier studies into public attitudes to flooding and flood risk, the consultation results have shed some light onto some of the key issues surrounding PLFP. Analysis of floodwater pathways into properties has shown that very simple PLFP measures, such as door barriers and airbrick covers, would prevent almost 60% of reported internal flooding events. In contrast to previous UK findings, and despite the low numbers of respondents being aware of their own responsibility to protect their property, the emergence of effective public education campaigns seems to have led to an increase in awareness of PLFP measures, amongst those both previously flooded and non-flooded households. The drive to investigate PLFP options has also been shown to be linked to the scale of flooding and impacts, rather than just the frequency. Although this research indicates a significantly higher uptake for PLFP than previous UK studies, much of this has again been reactive rather than proactive, with the majority of households only acting after being flooded.

The consultation results also confirm that the public appear more willing to pay for PLFP than previous UK studies have suggested, both in terms of the number of households willing to contribute and the scale of these contributions. In addition, the results also indicate that people without previous flood experience may over estimate the cost of protecting their property. Unsurprisingly perhaps, there

appears to be a link between people's willingness to pay and both the level of financial aid previously received for PLFP and the level of building damage previously sustained.

For institutional stakeholders, understanding the reasons why some households are unwilling to pay for PLFP is important, as this is a key step in developing strategies to increase the uptake of such measures. Interestingly, whilst just over half felt that they could not afford PLFP measures, these groups were found to be more likely to contribute towards the cost if subsidies or incentives packages were available. A similar number also felt that the government/council should pay for such protection, which again highlights the need for better education of the public with respect to flood protection responsibilities.

Work is now underway to develop a whole life cost model to better understand the cost/benefit balance of PLFP measures under a range of different future loading conditions.

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